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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

WOZNIAK, JAMES S

ART UNIT PAPER NUMBER

2655

DATE MAILED: 09/20/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/022,737

Applicant(s)

LINDGREN ET AL.

Examiner

James S. Wozniak

Art Unit

2655

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37.CFR-1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 December 2001.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-44 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-14 and 23-36 is/are rejected.
- 7) ☒ Claim(s) 15-22 and 37-44 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 March 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____

DETAILED ACTION

Claim Objections

1. **Claim 23** is objected to because of the following informalities: "the method" in line 2 should be changed to --the apparatus—in order to provide proper antecedent basis.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. **Claims 1-3, 9, 12-14, 23-25, 31, and 34-36** are rejected under 35 U.S.C. 102(b) as being anticipated by Iyengar et al (*U.S. Patent: 5,455,888*).

With respect to **Claims 1 and 23**, Iyengar discloses:

Analyzing the first narrow-band speech signal to generate one or more parameters (*LPC analysis, Col. 3, Line 63- Col. 4, Line 18*);

Synthesizing a first higher frequency-band signal based on at least one of the one or more parameters (*Col. 4, Lines 26-49*);

Generating a second higher frequency-band signal by amplifying the first higher-frequency band signal by a gain amount that is based, at least in part, on one or more spectral amplitude peaks in the first narrow-band speech signal (*gain applied to a highband speech signal, Col. 5, Lines 28-59, and gain calculation utilizing the log spectral-shape of a lowband speech signal, Col. 4, Lines 26-49*); and

Combining the second higher frequency-band signal with a second narrow-band speech signal that is derived from the first narrow-band speech signal (*up-sampling a narrowband signal through interpolation and an adder for combining the highband and narrowband signals to produce a wideband signal, Col. 7, Lines 1-56; Col. 1, Lines 28-53*).

With respect to **Claims 2 and 24**, Iyengar further discloses up-sampling an 8kHz input speech signal to 16kHz (*Col. 7, Lines 44-56*).

With respect to **Claims 3 and 25**, Iyengar teaches the calculation of a residual signal from an input narrowband signal (*Col. 3, Lines 32-52*).

With respect to **Claims 9 and 31**, Iyengar discloses:

The one or more parameters include a set of amplitude parameters that are proportional to amplitudes of pole frequency components of the first narrow-band speech signal (*Col. 3, Lines 32-52*); and

Amplifying the first higher frequency-band signal comprises:

Using a first gain amount if the first narrow-band speech signal is judged to represent voiced speech; and using a second gain amount if the first narrow-band speech signal is judged to represent fricated speech (*applying different gains based on a voiced/unvoiced determination, Col. 4, Line 58- Col. 5, Line 27*).

With respect to **Claims 12 and 34**, Iyengar further recites:

The amplitude parameters are logarithmically scaled (*log spectrum, Col. 4, Lines 26-49*);

Using the first gain amount comprises making a first linear combination of the amplitude parameters; and using the second gain amount comprises making a second linear combination of the amplitude parameters (*vector quantization utilizing different gains, Col. 5, Lines 28-62*).

With respect to **Claims 13 and 35**, Iyengar further teaches the use of the original narrowband speech signal in combination with an artificial highband signal to create a wideband speech signal (*Col. 3, Lines 32-52*).

With respect to **Claims 14 and 36**, Iyengar discloses:

Synthesizing a lower frequency-band signal based on at least one of the one or more parameters (*lowband line spectrum, Col. 7, Lines 27-56*), and

Wherein combining the second higher frequency-band signal with a second narrow-band speech signal that is derived from the first narrow-band speech signal comprises combining the second higher frequency-band signal, the second narrow-band speech signal that is derived from the first narrow-band speech signal and the lower frequency-band signal (*Col. 7, Line 27- Col. 8, Line 17; Col. 3, Lines 32-52; and Col. 1, Lines 28-53*).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person

having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. **Claims 10-11 and 32-33** are rejected under 35 U.S.C. 103(a) as being unpatentable over Iyengar et al in view of Borth et al (*U.S. Patent: 4,630,305*).

With respect to **Claims 10 and 32**, Iyengar teaches the method and system for creating a wideband speech signal from a narrowband speech signal utilizing different gains based on a voiced/unvoiced determination, as applied to Claims 9 and 31. Iyengar does not specifically suggest utilizing a third gain in the case of neither voiced nor unvoiced speech, however Borth teaches utilizing a minimum gain value of 0 for a signal comprising only noise (Col. 8, Lines 47-68).

Iyengar and Borth are analogous art because they are from a similar field of endeavor in speech signal enhancement. Thus, it would have been obvious to a person of ordinary skill in the art, at the time of invention, to modify the teachings of Iyengar with the use of a minimum gain for a signal comprising only noise as taught by Borth to implement an effective for noise suppression (*Borth, Col. 8, Lines 62-68*).

With respect to **Claims 11 and 33**, Borth teaches a gain value of 0 as applied to Claims 10 and 32.

6. **Claims 4-5 and 26-27** are rejected under 35 U.S.C. 103(a) as being unpatentable over Iyengar et al in view of Liljeryd et al (*U.S. Patent: 6,680,972*).

With respect to **Claims 4 and 26**, Iyengar teaches the method and system for creating a wideband speech signal, as applied to Claims 1 and 23. Iyengar does not specifically suggest spectrum information that identifies harmonic tones or copied spectral narrowband signal used to

generate a higher frequency band signal, however Liljeryd teaches a process for replicating harmonic speech data from a spectral band (*Col. 7, Lines 15-36; Col. 2, Lines 54-61; and Fig. 2*).

Iyengar and Liljeryd are analogous art because they are from a similar field of endeavor in creating a wideband signal from a narrowband speech signal. Thus, it would have been obvious to a person of ordinary skill in the art, at the time of invention, to modify the teachings of Iyengar with the method of copying harmonic data from a narrowband signal into a higher frequency region as taught by Liljeryd in order to eliminate dissonance in content reduction encoding, and thus, improve perceptual quality (*Liljeryd, Col. 1, Lines 47-57; Col. 2, Lines 40-60*).

With respect to **Claims 5 and 27**, Liljeryd further teaches bandpass filtering the replicated spectral signal (*Col. 7, Lines 36-46*).

7. **Claims 6, 8, 28, and 30** are rejected under 35 U.S.C. 103(a) as being unpatentable over Iyengar et al in view of Liljeryd et al, and further in view of McCree (*U.S. Patent: 5,966,689*).

With respect to **Claims 6 and 28**, Iyengar in view of Liljeryd teaches the method and system for creating a wideband speech signal utilizing spectral copying and bandpass filtering, as applied to Claims 5 and 27. Iyengar in view of Liljeryd does not specifically suggest implementing formant filtering after bandpass filtering, however McCree teaches such an implementation (*Col. 4, Lines 4-23*).

Iyengar, Liljeryd, and McCree are analogous art because they are from a similar field of endeavor in speech signal enhancement. Thus, it would have been obvious to a person of ordinary skill in the art, at the time of invention, to modify the teachings of Iyengar in view of

Liljeryd with the formant filtering taught by McCree in order to provide a speech output which more closely matches input speech (*McCree, Col. 4, Lines 4-23*).

With respect to **Claims 8 and 30**, Iyengar in view of Liljeryd teaches the method and system for creating a wideband speech signal utilizing spectral copying as applied to Claims 4 and 26, while McCree teaches the process of formant filtering as applied to Claims 6 and 28.

8. **Claims 7 and 29** are rejected under 35 U.S.C. 103(a) as being unpatentable over Iyengar et al in view of Liljeryd et al, in view of McCree, and further in view of Kagoshima et al (*U.S. Patent: 6,240,384*).

With respect to **Claims 7 and 29**, Iyengar in view of Liljeryd teaches the method and system for creating a wideband speech signal utilizing spectral copying, bandpass filtering, and formant filtering, as applied to Claims 6 and 28. Iyengar in view of Liljeryd does not specifically suggest implementing formant filtering only if a speech signal is voiced, however Kagoshima teaches such an implementation (*Col. 22, Lines 13-14*).

Iyengar, Liljeryd, McCree, Kagoshima are analogous art because they are from a similar field of endeavor in speech signal enhancement. Thus, it would have been obvious to a person of ordinary skill in the art, at the time of invention, to modify the teachings of Iyengar in view of Liljeryd with implementation of providing formant filtering for voiced speech as taught by Kagoshima in order to provide a more efficient means of formant filtering requiring less calculations since only voiced speech would be processed (*Kagoshima, Col. 22, Lines 10-12*).

Allowable Subject Matter

9. **Claims 15-22 and 37-44** are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

10. The following is a statement of reasons for the indication of allowable subject matter:

With respect to **Claims 15 and 37**, the prior art fails to explicitly teach or specifically suggest a method and system for generating a wideband speech signal from a narrowband speech signal that synthesizes a lower frequency band using a pitch frequency parameter to generate continuous sine tones. The generated lower band signal is then combined with a higher band signal, generated from an original narrowband speech signal, and the original narrowband speech signal to generate the wideband speech signal. Although Iyengar teaches the use of pitch analysis in generating a lower frequency signal (*Col. 7, Line 27- Col. 8, Line 17*), Iyengar fails to disclose that the lower frequency signal comprises generated sine tones based upon a pitch frequency parameter.

Claims 16-22 and 38-44 further limit claims containing allowable subject matter, and thus, also contain allowable subject matter.

Conclusion

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

Galand et al (*U.S. Patent: 5,001,758*)- teaches a method for deriving a high frequency component from a base band signal.

Tsushima et al (*U.S. Patent: 5,978,759*)- teaches a method for bandwidth expansion of a narrowband signal.

Deutgen (*U.S. Patent: 6,507,820*)- teaches a method for bandwidth expansion involving copying a narrowband signal.

Breen (*U.S. Patent: 6,691,083*)- teaches a method for synthesizing a wideband signal from a narrowband signal.


Gustafsson (*U.S. Patent: 6,889,182*)- teaches a method that enables speech bandwidth extension.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to James S. Wozniak whose telephone number is (571) 272-7632. The examiner can normally be reached on M-Th, 7:30-5:00, F, 7:30-4, Off Alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wayne Young can be reached on (571) 272-7582. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

James S. Wozniak
8/17/2005



W. R. YOUNG
PRIMARY EXAMINER